

R E M A R K S

This is in response to the Office Action that was mailed on March 19, 2003. The Examiner has kindly indicated that -- regarding substrates -- the specification herein *is* **"enabling"** for a hydrocarbon, an alcohol, an aldehyde, a ketone, an amide, a heterocyclic compound, a thiol, a sulfide, and an amide". Applicants have accordingly amended claim 1 to recite those substrates. Applicants exclude "an isoprenoid which has at least one allylic hydrogen atom" from the substrates. No isoprenoid having an allyl group is employed in the Examples of the present specification. The working Examples from line 27 on page 96 through line 24 on page 111 disclose experiments conducted using cyclohexane, adamantanol, adamantane, p-xylene, m-xylene,  $\beta$ -picoline, 1,2,4,5-tetramethylbenzene, p-tert.-butyltoluene, fluorene, and diphenylmethane as substrates. No new matter is added by this Amendment. Claims 1-3 and 18 remain in the case.

Objection was raised to claims 1-3 and 18 as containing non-elected subject matter. In order to expedite prosecution of the present application, Applicants have deleted the non-elected subject matter from the claims. Applicants reserve the right to file a divisional application directed to the non-elected subject matter.

Claims 1-3 and 18 were rejected under the first paragraph of 35 U.S.C. §112. The Examiner indicates that this rejection is made

... because the specification, while being enabling for a hydrocarbon, an alcohol, an aldehyde, a ketone, an amide, a heterocyclic compound, a thiol, a sulfide, and an amide for the substrate does not reasonably provide enablement for [all substrates].

The claims are now limited to the genus of substrates acknowledged by the Examiner to be enabled, thereby obviating this ground of rejection.

Claims 1-3 and 18 were rejected under 35 U.S.C. §102(b) as being anticipated by US 5,030,739 (Foricher). The rejection is respectfully traversed.

Foricher discloses a process for the catalytic oxidation of an isoprenoid which has at least one allylic hydrogen atom, which process comprises oxidizing the isoprenoid with oxygen or a gas which containing oxygen in an inert solvent, in the absence of a basic compound or a compound with an acidic hydrogen and in the presence of an N-hydroxydicarboxylic acid imide of the formula, to produce a hydroperoxide.

Foricher teaches that "isoprenoids which possess a methyl, methylene or methyne group on a C-C double bond are oxidized" (col. 2, lines 39-42) and "The above terms isoprenoid, ... embrace not only hydrocarbons with an isoprenoid structural basis, but also alcohols, aldehydes, ketones and esters derived therefrom." (col. 3, lines 13-16). As the imide, N-hydroxyphthalimide is disclosed (patent claim 7). As the inert solvent, there may be mentioned alkanone, cycloalkanone, or alkylalkanoate with a maximum of 8 carbon atoms (patent claim 8), specifically, methyl isobutyl ketone, acetone, cyclohexanone or ethyl acetate (patent claim 9). Concerning the separation of the catalyst (the N-hydroxydicarboxylic acid imide), Foricher teaches, at column 4, lines 50-62, as follows:

After the oxidation, the catalyst can be separated from the reaction mixture e.g., with aid of a non-polar solvent, and can be reused. The reaction mixture can be concentrated, then treated with a non-polar solvent and the catalyst can be crystallized-out. The solvent which is used in the oxidation is removed completely by evaporation and the residue is taken up in a non-polar solvent, in which the catalyst remains behind as an insoluble residue. Examples of the non-polar solvents are hydrocarbons and non-polar chlorinated hydrocarbons such as hexane, tetrachloromethane and the like.

Moreover, the oxidation products in Foricher can be separated from the reaction mixture according to known methods (column 5, lines 3-4). If desired, the hydroperoxides obtained can be further reacted to give alcohols or carbonyl compounds (column 5, lines 5-6). The reduction of the hydroperoxides to alcohols can be carried out according to methods known in the art (column 5, lines 9-10). Primary and secondary hydroperoxides can be converted into the corresponding carbonyl compounds by water cleavage (column 5, lines 15-17).

However, the substrate used in Foricher is a special substrate, isoprenoid having an allyl group. The isoprenoids, as well as the products obtained from the isoprenoids, have a complicated structure and differ considerably from the conventional substrates in chemical and/or physical characteristics. In particular, it could not be predicted from Foricher how the solubility or crystallizability differs, especially between the imide compound and the products, in connection with a solvent and/or temperature. This is clearly substantiated by the fact that the cited reference forms hydroperoxides by the reaction and the hydroperoxides are further reduced to give alcohols or are water-cleaved to form carbonyl compounds.

Furthermore, the Foricher reaction can be carried out in an inert solvent such as cycloalkanone (e.g., cyclohexanone) in the absence of a compound with an acidic hydrogen. Incidentally, it should be noted that the cycloalkanones such as cyclohexane produce alcohols, ketones, or acids without reduction in the present invention.

In contrast, according to the present invention, as is apparent from the Examples herein, alcohols, ketones, or acids can be formed without reduction or water-cleavage of hydroperoxides. That is, they can be directly produced by a single reaction.

Thus, since the present invention differs remarkably from Foricher not only respecting the substrate but also in the reaction mechanisms, the present invention is neither taught nor suggested by Foricher.

Moreover, unexpected advantages are obtained in accordance with the present invention. That is, Foricher requires further subjecting hydroperoxide to reduction or water-cleavage for obtaining alcohols or carbonyl compounds. The reaction of Foricher should be carried out in the absence of a compound with an acidic hydrogen, while the reaction of the present invention can proceed efficiently in an acidic solvent (e.g., Example A1-2, etc.). Thus, since the substrate and the reaction mechanisms herein are considerably different from those of Foricher, in accordance with the present invention, final products -- such as an alcohol, an alcohol derivative, an aldehyde, a ketone, and a carboxylic acid -- can be effectively obtained by direct reaction.

The Examiner is respectfully requested to withdraw the rejection of record, and to pass this application to Issue.


The Examiner is invited to contact Richard Gallagher (Reg. No. 28,781) at (703) 205-8008 with any questions.

If necessary, the Commissioner is hereby authorized in this, concurrent, and further replies, to charge payment or credit any overpayment to Deposit

Appl. No. 09/980,588

Account No. 02-2448 for any additional fee required under 37 CFR 1.16 or 1.17;  
particularly, extension of time fees.

Respectfully submitted,  
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